WHAT IS CLAIMED IS:

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1. A method for determining the position and orientation of an object with respect to a reference frame, comprising the steps of:

(a) providing the object with three independent transmitters of electromagnetic radiation;

(b) providing three independent receivers of said electromagnetic radiation, each of said receivers having a fixed position in the reference frame;

(c) transmitting said electromagnetic radiation, using said transmitters, a first of said transmitters transmitting said electromagnetic radiation including at least a first frequency, a second of said transmitters transmitting said electromagnetic radiation including at least a second frequency different from said first frequency, and a third of said transmitters transmitting said electromagnetic radiation including at least a third frequency different from said first frequency;

(d) receiving signals corresponding to said electromagnetic radiation, at all three of said receivers, at a plurality of times, each of said signals including components of at least one of said three frequencies;

(e) for each of said receivers, forming a first function of said components including said components of said signal received by said each receiver from said first transmitter at said first frequency, a function of said components including said components of said signal received by said each receiver from said second transmitter at said second frequency, and a function of said components including said components of said

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signal received by said each transmitter from said third transmitter at said third frequency, said functions being independent of a time delay between said transmitters and said receivers; and

(f) inferring the position and the orientation of the object from said functions.

2. The method of claim 1, wherein said third frequency is different from said second frequency.

3. The method of claim 1, wherein, for each of said receivers, said first function includes said components of a strongest of said signals received by any of said receivers at said first frequency, said second function includes components of a strongest of said signals received by any of said receivers at said second frequency, and said third function includes components of a strongest of said signals received by any of said receivers at said second frequency.

4. The method of claim 1, wherein said second frequency and said third frequency are even multiples of said first frequency.

5. The method of claim 4, wherein said second frequency and said third frequency are equal.

6. The method of claim 4, wherein, for each of said receivers, all three of said functions include said components of a strongest of said signals received by any of said receivers at said first frequency.

7. A method for determining the position and orientation of an object with respect to a reference frame, comprising the steps of:

(a) providing the object with three independent transmitters of electromagnetic radiation;

(b) providing three independent receivers of said electromagnetic radiation, each of said receivers having a fixed position in the reference frame, at least one of said receivers being spatially extended;

(c) transmitting said electromagnetic radiation, using said transmitters, a first of said transmitters transmitting said electromagnetic radiation including at least a first frequency, a second of said transmitters transmitting said electromagnetic radiation including at least a second frequency different from said first frequency, and a third of said transmitters transmitting said electromagnetic radiation including at least a third frequency different from said first frequency;

(d) receiving signals corresponding to said electromagnetic radiation, at all three of said receivers, at a plurality of times; and

(e) inferring the position and the orientation of the object noniteratively from said signals.

8. The method of claim 7, wherein said third frequency is different from said second frequency.

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9. The method of claim 7, wherein each of said signals including components of at least one of said three frequencies, the method further comprising the step of:

(f) for each of said receivers, forming a first function of said components including said components of said signal received by said each receiver from said first transmitter ~~at~~ said first frequency, a function of said components including said components of said signal received by said each receiver from said second transmitter at said second frequency, and a function of said components including said components of said signal received by said each transmitter from said third transmitter at said third frequency, said functions being independent of a time delay between said transmitters and said receivers;

said position and orientation of the object being inferred from said functions.

10. The method of claim 7, further comprising the step of:

(f) calibrating said inferring of the position and orientation of the object.

11. The method of claim 10, wherein said calibrating includes predicting said signals at a number of calibration positions and a number of calibration orientations.

12. The method of claim 11, wherein said number of calibration positions is at least 36 and said number of calibration orientations are at least 36.

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13. The method of claim 10, wherein said calibrating includes measuring said signals at a number of calibration positions and a number of calibration orientations.

14. The method of claim 13, wherein said number of calibration positions is at least 36 and said number of calibration orientations are at least 36.